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Reprinted from SCIENCE
Vol. 106, No. 2753, October 3, 1947

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A Monitoring Probe for Radiochemistry Laboratories[1]

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In order to detect contamination of equipment and to protect the health of workers in laboratories handling radioactive materials, it is necessary to have instruments capable of indicating small amounts of radiation at the working space and on the person and clothing of workers. Several excellent portable radiation meters are now on the market, but only the most recent ones are effective in detecting weak radiation, the older ones generally being designed for monitoring X-rays.

As Libby (*1*) points out, the isotopes emitting the least energetic radiation are among the most useful. By substituting a more sensitive GM tube for the one ordinarily furnished, older instruments easily may be changed to permit them to detect a fraction of these weak radiations large enough so that they may be of service in monitoring laboratories. Moreover, the housing for the GM tube described here permits using the tube at some distance from the meter, allowing more flexibility in monitoring and incidentally permitting any scaler to be used as a detector of contamination.

A thin-walled, silvered, self-quenching tube is mounted in a stainless-steel housing, provided with mesh-covered windows over the sensitive area of the tube. The use of stainless steel permits ready decontamination of the probe itself in case of contamination, a nitric acid wash being sufficient in most cases. Fig. 1 shows some of the constructional details of the probes used in this Laboratory. A, the body of the probe, is tubing, 10 inches long and 1 inch in diameter, which is attached to handle C by means of collar E. Tube B slides over A and can be secured in a position over the windows by tapered collar D. When not required in this position to protect the GM tube or to distinguish gamma from beta radiation, it is pushed back toward handle C. By making slide B $\frac{1}{16}$ inch thick, the original calibration (in R's/8-hour day) of a Herbach and Rademan Model GLR-200 Radiation Meter is sensibly unchanged when B covers the windows. With the slide open, the sensitivity of this meter is increased more than 10-fold for energetic radiation, and the detection of weak radiation is made possible. Traces of C^{14}, for example, are distinctly indicated, although weaker radiation (*1*) is not detected.

By means of a suitable connector at the end of handle C the probe is attached to the meter or scaler with co-axial cable, up to 20 feet long. In the authors' experience, the high potential supplied by an AC-operated type radiation meter requires very little change in value to enable the new tube to work on its plateau (ca. 800 volts for commercial tubes of this type).

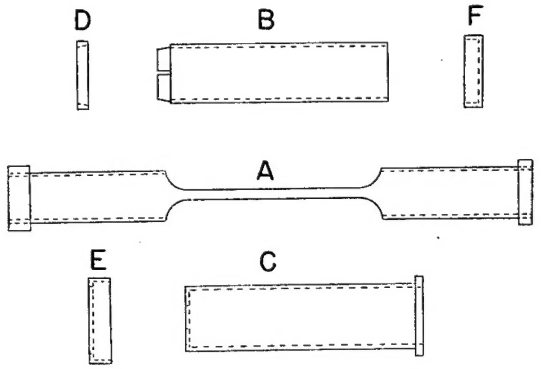

FIG. 1

In one application, this probe was attached to a Herbach and Rademan meter to which, in turn, had been added a simple audioamplifier and loud-speaker, obviating the necessity of looking at the meter while testing for stray radioactivity. The frequency of occurrence of the audible clicks is a measure of the intensity of the radiation passing through the probe. In another application, the described probe was attached to a standard scaler of 64, where it worked equally well.

[1] Research sponsored by the Office of Naval Research, Contract N-6 ori-47, Task Order No. 4.

Reference

1. LIBBY, W. F. *Ind. eng. Chem.* (Anal. ed.), 1947, **19**, 2-6.